



Australian Brumby Alliance (ABA)

Brumby Resource Information-3.5

www.australianbrumbyalliance.org.au

Brumby Manure Concerns

The 2014 NPWS NSW Wild Horse management review *Chat Room* included claims by park visitors that they had been sick after using water where Brumbies had been seen, such as “I’ve suffered from bacterial illnesses due to those same streams being polluted by horse dung”.

[Adda Quinn](#) researched health concerns relating to horse manure in the USA and concluded that it neither contains significant amounts of hazardous chemicals, nor exhibits hazardous characteristics – in short horse manure is not toxic to humans.

Other examples of National Park information claims of health risks or water fouling from the presence of Brumbies, such as:-

- **Parks Victoria** information paper 1 explains that Wild Horse activity can lead to the degradation of waterways and a reduction of water quality in streams; and their information paper 3 includes “Reported impacts include: horses wandering through campsites, dung-piles, noise disturbance and contamination of drinking water through stream bank damage and faeces (Wright et al. 2006).
- **Namadgi National Park** feral horse management plan 2007 states that “From the perspective of the domestic water supply catchment, the presence of livestock, including horses can also have potential consequences for human health. Cattle, pigs, sheep and horses are known to carry the parasite *Cryptosporidium parvum* (Cole et al. 1998), which can cause serious gastroenteritis if it contaminates drinking water.

Adda Quinn’s research paper explains *why*, if a park visitor becomes sick while enjoying the park’s environment - it will *not result from Brumby manure*, but more likely from other animal and human excrement, and may simply be poor personal hygiene regimes.

DOES HORSE MANURE POSE A SIGNIFICANT RISK TO HUMAN HEALTH?

Adda Quinn <https://www.bayequest.info/static/pdf/manure.pdf> (1998) researched this subject to provide information for non-scientists about laws and regulations defining toxic and hazardous wastes, the chemical and pathologic contents of horse manure, and the potential risks to humans exposed to horse manure. The following is extracted from her document.

What Type Waste is Horse Manure?

Horse manure is a solid waste excluded from (USA) federal regulation because it neither contains significant amounts of listed hazardous components, nor exhibits hazardous properties. [*Toxicity Definition: Relating to or caused by a poison - Webster's Dictionary*].

What Chemicals Comprise Horse Manure and Are They Toxic?

Everything is toxic to something at some level (although not necessarily every substance to every species). Toxicity may be acute, chronic or bio-accumulative. Toxins come into the body by being ingested, inhaled or dermally absorbed. The sixteenth century Swiss physician, Paracelsus, first pointed out the fact that ALL substances are toxic and that the difference between a remedy and a poison is simply the amount that is taken into the body.

The primary chemical constituents of horse manure are about the same as harmless household and agricultural fertilizer. In fact, animal manure is a valuable agricultural amendment and has been used for millennia to help grow our food supplies. Thus, based on its chemical constituents, horse manure should not be considered toxic.

Pathogens of Concern

Generally speaking, horse guts do not contain the 120 viruses and constituents of concern in human, dog and cat faeces (carnivores and omnivores) (Atwill 1998, Putnam 1983, Davis et al 1996, Rugg 1998). Most viruses with zoonotic potential (animals infecting humans) are not found in horse wastes.

As a result of intensive studies on commercial livestock, some protozoa and bacteria have been identified that can survive in horse guts. Pathogens of primary concern are waterborne microorganisms that usually follow ingestion pathways into the body.

Adda's paper study focusses on *Cryptosporidium* and *Giardia* as *C. parvum* and *Giardia* are the two of most concern because they have very low thresholds of infectious dose.

Protozoa - Human Transmission of Disease

The genotype and experimental infection data suggest the possibility of 2 distinct populations of *C. parvum* in humans. One population appears to involve zoonotic transmission from calf-to-human with subsequent human-to-human and human-to calf transmission. The other population appears to involve an anthroponotic transmission cycle, exclusively in humans.

Protozoa - Equine Transmission of Disease

Several credible research papers have been published which demonstrate conclusively that adult horse guts do not significantly contain either *C. parvum* or *Giardia*, the two organisms of greatest human health concern when present in water supplies.

Dr. Rob Atwill of UC Davis/Tulare (a principle in the Johnson et al study) has found that wild animals have substantial rates of *C. parvum* in their guts, significantly higher than those found in either humans or horses. For example 30% of mice tested were found to have *C. parvum* in their guts; *similarly 63% of rats, and 11% of feral pigs* carried this organism.

Life expectancy of most of the protozoa discussed, when deposited in manure on a trail, is very short. [Atwill cites Robertson et al. 1992] "Oocysts appear to die after several hours of being dry".

Bacteria

Coliform bacteria are ubiquitous and are necessary beneficial organisms that help most normal healthy species including man and animals digest their food. *E. coli* under certain conditions - such as stress or infections - cause disease in its host or may be found as a secondary invader to other diseases. Strains that exist in one species generally do not affect others - consequently man's primary concern is for *E. coli* of human origin and then only if it

is found in his food or water - not because of the E. coli but because of other germs that may accompany it. While E. coli from a number of species, including humans, can cause intestinal disease under certain conditions, those of equine origin have not been shown to do so.

On concentrated reflection, I can come up with no explanation why the horse should be singled out as a likely source of human disease.

In the winter 2000-2001, Dr. Atwill of UC Davis Tulare, conducted a further research study on 250 horses in the San Francisco Bay Area. Due to concerns expressed by organic gardeners about the safety of using composted horse manure as a soil amendment, Atwill determined again that insignificant levels of E. coli 0157:H7 and Salmonella were in adult horse guts. Composted manure showed no E. coli 0157:H7 after 24 hours in pile residence.

A 1998 NAHMS study on "Salmonella and the US Horse Population" confirms Salmonella is not an issue in horses (www.aphis.usda.gov/vs/ceah/cahm/Equine/eq98salm.htm).

Is the Risk of Human Exposure to Untreated Horse Manure Acceptable?

There are three types of risks: *true risk*, *calculated risk*, and *perceived risk*. No major human disease has ever been accurately attributed to the intimate contact human beings have had with horse manure for thousands of years. Veterinarians and vet students probably have the greatest exposure to true risk from horse manure. Horses are physiologically incapable of vomiting or regurgitating. As a result, vets can armpit deep under a horse's tail, nevertheless, there has never been a documented case of veterinarians contracting illness as a result of this extreme true exposure to horse manure.

Because horses are encountered infrequently by most people, it is likely that their perceived risk of exposure to horse manure is *actually much higher than their true risk*.

Horse manure is about 70-80% liquid and 20-30% solids. The liquid portion is quickly retained by soil or vaporizes rapidly into the atmosphere. In composted scenarios, total mineralization (breakdown into CO₂ and H₂O) occurs within 21 days with more than 50% of the total CO₂ produced during the first 6 days.

According to Jeffrey Schaffer, wilderness writer, "700 backpackers in Desolation Wilderness contribute about a ton of human waste per week. Whereas horse and cattle excrement lying on the ground decomposes rapidly, buried human excrement takes longer, for in mountain soils, subsurface decomposers such as bacteria and fungi are not abundant".

Dr. Aaron Wildavsky, Professor at UC Berkeley has written, "The richest, longest-lived, best protected, most resourceful civilization is on its way to becoming the most frightened and Government has contributed to this process by taking responsibility for risk management away from individuals. *People are exposed to a variety of risks every day of their lives and must make decisions about which risks to ignore and which ones to manage actively. We believe that exposure to horse manure is one fear people can cross off of their list of things to worry about.*

We believe that based on the information currently available, the exposure of people to untreated horse manure on trails is an *acceptable* health risk.

Conclusion

Horse manure is a solid waste excluded from federal EPA solid waste regulation because it neither contains significant amounts of hazardous chemicals, nor exhibits hazardous characteristics. The chemical constituents of horse manure are not toxic to humans. Horse guts do not contain significant levels of the two waterborne pathogens of greatest concern to human health risk, Cryptosporidium or Giardia, neither do they contain significant amounts of the bacteria E. coli 0157:H7 or Salmonella. Fungus, viruses, bacteria and worms found in horses have never been shown to infect humans and are unlikely to be zoonotic.

People seldom encounter or handle horse manure. People who do have occasion to handle horse manure have never been infected by this intimate contact. Humans and other sources within the environment (e.g. wild animals and birds) with their overwhelming population numbers are far more likely than horses to contribute to human health risks.

While horse manure may not be aesthetically pleasing, it should *not be harmful* to human health *nor pose a significant health risk* to people when they encounter it on public trails.

REFERENCES

1. 40 CFR (Identification and Listing of Hazardous Wastes) Chapter 1 7-1-91 Sections 261.4, 261.2 and 251.3 and Table 1.
2. W. E. Harris. "Analysis of Risks and Authoritative Information". Analytical Chemistry. Vol. 64. No 13. July 1, 1992. Pp. 666-667.
3. T. S. Glickman and Gough, M. Reading in Risk. 1990. "Ranking Possible Carcinogenic Hazards" by Bruce Ames, Renae Magaw and Lois Swirsky Gold Pp. 76-92; "No Risk is the Highest Risk of All" by Aaron Wildavsky Pp. 120-128.; and "Risk, Science and Democracy" by William Rucklshaus Pp. 105-119.
4. Metcalf & Eddy, Inc. Wastewater Engineering Treatment, Disposal and Reuse. Third Ed. P.4.
5. Integrated Animal Waste Management, Task Force Report No. 128 November 1996 by Council for Agricultural Science and Technology.
6. Data from the American Horse Council, Press Release December 1996
7. E. R. Atwill. "Pathogens excreted by livestock and transmitted to humans through water". Information paper 1997.
 - Straub, T., I. Pepper and C. Gerba. 1993. "Hazards from Pathogenic Microorganisms in Land-Disposed Sewage Sludge". Reviews of Environmental Contamination and Toxicology, Vol. 132. Pp. 55-89. Davis, J. and A. Swinker. 1996. Horse Manure: A Renewable Resource. Livestock Series Management #1.219. Colorado State University Extension. www.colostate.edu/Depts/CoopExt NCSU. 2000. Emails between Carol Galloway of EPA to Dana Cole of the Animal Waste Management Programs at North Carolina State University Dept. of Biological and Agricultural Engineering.
 - NRAES. On-Farm Composting Handbook (NRAES-54), 1992 and Field Guide to On-Farm Composting (NRAES-114), 1999 Northeast Regional Agricultural Engineering Service Cooperative Extension 152 Riley-Robb Hall Ithaca, NY 14853-5701 (607) 255-7654 nraes@cornell.edu.
 - Putnam, R., 1983. "Carrion and Dung: the decomposition of animal wastes". The Institute of Biology's Studies in Biology No. 156. Pp. 6 and 28.
 - Personal Conversation with State of California Dept. of Fish and Game Toxicologist, Dr. Mike Rugg, 1998.
 - Atlas, Ronald and Richard Bartha. Microbial Ecology Fundamentals and Applications, 4th Ed. Addison Wesley Longman

8. M. M. Peng,¹ Xiao, L., ² Freeman, A. R., ² Arrowood, M. J., ² Escalante, A. A., ² Weltman, A. C., ³ Ong, C. S. L., ⁴ MacKenzie, W. R., ² Lal, A. A. ², and Beard, C. B. ² "Genetic Polymorphism Among Cryptosporidium parvum Isolates: Evidence of 2 Distinct Human Transmission Cycles." Emerging Infectious Diseases. Vol. 3. No. 4. Oct.-Dec. 1997. Pp. 567-573. University of Michigan¹, CDC Atlanta², PA Dept. of Health³, University of British Columbia⁴.
9. "San Francisco Public Utilities Commission Cryptosporidium White Paper". City and County of San Francisco. 1996.
10. E. Johnson, Atwill, E. R., Filkins, M. E., and Kalush, J. "The prevalence of shedding of Cryptosporidium and Giardia spp. based on a single fecal sample collection from each of 91 horses used for backcountry recreation." Journal of Veterinary Diagnostic Investigation. Vol. 9. Pp. 56-60. 1997.
11. K. N. Ford, Swinker, A.M., Traub-Dargatz, J. L., and Cheney, J. M. "The Prevalence of Cryptosporidium/Giardia in the Trail Horse Population Utilizing Public Lands." Proceedings of 15th Equine Nutritional Physiology Symposium. Pp. 223-237. 1997, and JEVS 18 (1) 1998. And paper available by Laurie Fio with Rob Atwill: "Cryptosporidium in the Water - Are Horses to Blame?"
12. Wayne O. Kester, D.V.M. Brigadier General, U.S.A.F. (VC) Retired Executive Director, American Association of Equine Practitioners at the 22nd Annual Convention of the A.A.E.P./ Dr. Ernest L. Biberstein, D.V.M., Ph.D. Professor of Microbiology School of Veterinary Medicine University of California Davis, California 95616
13. The Economic Impact of the Horse Industry in the United States Vol. 2: Estimates for Eleven Focus States. Prepared for the American Horse Council Foundation by the Barents Group LLC, January 1996, P. 3.
14. N. Deuel. "Land Use and Zoning Issues Affecting the Horse Industry". Jour. Equine Vet. Sci. 1989. Vol. 9, No. 1, pp.51-55.
15. Ibid. Johnson, Atwill et. al.
16. Pers. comm. with Dr. Deanne Meyer, UC Davis Manure Management Specialist, February 1997.
17. H. A. Ajwa and Tabatabai, M. A. "Decomposition of different organic materials in soils". Biol. Fertil. Soils. 1994. Vol. 18. Pp. 175-182.
18. J. Schaffer. The Tahoe Sierra. 1987. P. 20.

Background to Adda Quinn

Adda Quinn was involved in environmental research with the Electric Power Research Institute for 21 years. She is knowledgeable in contaminated soil and groundwater issues, and became interested in equine trail impacts and invasive plant species as she approached retirement in the mid 1990s and was able to do more horseback riding in remote areas. Since retirement she has edited documents for the USDA and other agencies, raised funding for university research to understand the impact of equids on public land through a not-for-profit group she helped found, EnviroHorse, and produced synthesis documents on various aspects of horse use and the environment.

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